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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/706,767	11/12/2003	Peter Micah Sandvik	134166	7781

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Jean Testa, Esq.
GE Global Research Center
P.O. Box 8
Schenectady, NY 12301

EXAMINER	
CYGAN, MICHAEL T	

ART UNIT	PAPER NUMBER
2855	

DATE MAILED: 08/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/706,767	SANDVIK ET AL.	
	Examiner	Art Unit	
	Michael Cygan	2855	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-51* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-51* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *11/12/2003*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1-6, 12-15, 17, 18, 20 22, 25-30, 36-38, 40, 41, and 44 are rejected under 35 U.S.C. 102(b) as being anticipated by von Windheim (US 5,285,084). Windheim discloses the claimed invention, a gas sensing Schottky diode comprising a partially doped semiconductor (diamond, SiC, gallium nitride, or boron nitride) substrate [18,11], a catalytic gate electrode (Pt or Pd) [12], an ohmic contact [13] of a refractory metal such as titanium, a passivation layer [21] of silicon dioxide, and an encapsulation layer [17]; the sensor detects gases such as hydrogen at temperatures up to about 1400 degrees Celsius. See entire document, especially Figure 1 and columns 1-6.

2. Claims 1-6, 13-15, 17, 20-22, 24, 48, and 49 are rejected under 35 U.S.C. 102(b) as being anticipated by Baranzahi (US 6,109,094). Baranzahi discloses the claimed invention, a gas sensing Schottky diode, FET, or MISFET comprising a partially doped semiconductor (SiC or diamond) substrate [1], a stack of catalytic layers including a catalytic gate electrode (Pt

or Pd) [5], an ohmic contact of a metal such as platinum, a passivation layer [2] of silicon dioxide; the sensor is heated (inherently by a heater means which maintains the temperature at 650 degrees Celsius as shown in Figure 4) and detects gases such as hydrocarbon or oxygen at temperatures up to at least 800 degrees Celsius. See entire disclosure, especially Figures 2-4 and columns 2-6.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 7-10 and 31-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over von Windheim (US 5,285,084) in view of Sibbald (US 4,931,851). Windheim teaches the claimed invention except for the use of osmium, platinum/rhodium, vanadium oxide, or mixtures thereof as the catalytically active metal. Sibbald teaches the use of osmium, platinum/rhodium, vanadium oxide, or mixtures thereof as the catalytically active metal; see column 3 lines 21-54 and column 4 lines 35-49. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use osmium, platinum/rhodium, vanadium oxide, or mixtures thereof as the catalytically active metal as taught by Sibbald in the

invention taught by Windheim, since different metals are taught to have specificity for different analyte gases.

4. Claims 11 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over von Windheim (US 5,285,084) in view of Onaga (US 4,816,800). Windheim teaches the claimed invention except for the use of lanthanium metal oxide as the catalytically active metal. Onaga teaches the use of $LaNiO_3$ as a metal oxide semiconductor to replace a Pt-Rh gas sensor; see columns 1-2. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use lanthanum metal oxide as the catalytically active metal as taught by Onaga in the invention taught by Windheim, since Onaga teaches the advantage of corrosion prevention.

5. Claims 19, 42 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over von Windheim (US 5,285,084) in view of Najafi (US 6,140,144). Windheim teaches the claimed invention except for the use of a flip-chip design. Najafi teaches a flip-chip design for gas microsensors; see abstract. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a flip-chip design as taught by Najafi in the invention taught by von Windheim to form the sensor, since Najafi teaches the advantages of controlling the sensor environment.

6. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over von Windheim (US 5,285,084) in view of Kang (US 5,656,827). Windheim teaches the claimed invention except for the use of multiple sensors sensing different gases. Kang teaches a FET sensor array having multiple gas selectivites; see column 11 lines 49-59. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use multiple sensors sensing different gases as taught by Kang in the invention taught by von Windheim to form the sensor, since this would allow more discriminate analysis of the sensing fluid.

7. Claims 16 and 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baranzahi (US 6,109,094) in view of Khan (US 6,690,042 B2). Baranzahi teaches the claimed invention except for the use of a heterostructure barrier layer to form a MISHFET. Khan teaches the use of a heterostructure AlGaN layer in a MISFET; see Figure 3. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a heterostructure barrier layer to form a MISHFET as taught by Khan in the invention taught by Baranzahi, since Khan teaches the advantage of lower leakage currents as well as improved performance characteristics; see abstract.

8. Claims 25-30, 41, 43, and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baranzahi (US 6,109,094) in view of von Windheim (US 5,285,084). Baranzahi teaches the claimed invention except for an encapsulation layer. Von Windheim teaches an encapsulation layer for a FET gas sensor; see [17] of Figure 1. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use an encapsulation layer as taught by von Windheim in the invention taught by Baranzahi to form the sensor, since von Windheim teaches the advantage of protection of the sensor elements.

9. Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Baranzahi (US 6,109,094) in view of von Windheim (US 5,285,084) as applied to claim 25, further in view of Khan (US 6,690,042 B2). Baranzahi teaches the claimed invention except for the use of a heterostructure barrier layer to form a MISHFET. Khan teaches the use of a heterostructure AlGaN layer in a MISFET; see Figure 3. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a heterostructure barrier layer to form a MISHFET as taught by Khan in the invention taught by Baranzahi, since Khan teaches the advantage of lower leakage currents as well as improved performance characteristics; see abstract.

10. Claim 50 is rejected under 35 U.S.C. 103(a) as being unpatentable over Baranzahi (US 6,109,094) in view of Shields (US 5,698,771). Windheim (US 5,285,084) as applied to claim 25, further in view of Khan (US 6,690,042 B2). Baranzahi teaches the claimed invention except for the use of an AlN insulating layer. Shields teaches the use of an AlN insulating layer in a MISFET sensor; see column 5 lines 9-28. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use an AlN insulating layer as taught by Shields in the invention taught by Baranzahi, since Shields teaches that AlN and silicon oxide films are equivalent for use as insulator layers.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Harris (US 6,278,133 B1) and von Windheim (US 5,362,975) teach similar FET/diode sensors.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Cygan whose telephone number is (571) 272-2175. The examiner can normally be reached on 8:30-6 M-Th, alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Lefkowitz can be reached on 571-272-2180. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MICHAEL CYGAN, PH.D.
PRIMARY EXAMINER